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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/029,282

Applicant(s)

BOERTJES ET AL.

Examiner

Christina Y. Leung

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5,7-15,17-19,23-27 and 29-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7-15,17-19,23-27 and 29-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 7, 12-15, 17, 19, 24, and 30-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Cao (US 6,169,616 B1)** in view of **Danagher et al. (US 5,959,749 A)**.

Regarding **claim 1**, Cao discloses a method of implementing programmable optical add/drop multiplexing (Figures 3A, 3B, and 5), the method comprising:

demultiplexing a respective input WDM (wavelength division multiplexed) optical signal into a plurality of optical path signals each comprising at least one channel (using WDM MUX/DEMUX 320 in add/drop module 10; Figure 3B; column 4, lines 16-57);

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using switch matrix module 30 (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44);

multiplexing, a plurality of optical path signals into an output WDM optical signal (using WDM MUX/DEMUX 320 in the other add/drop module 20); and

performing chromatic dispersion compensation and amplitude compensation wherein a respective at least one of chromatic dispersion and amplitude of the output WDM optical signal is independent of the add/drop function and corresponds to a target value (using dispersion

Art Unit: 2613

compensator 310, dispersion compensating fiber 330-1...n, amplifier 305, and variable attenuators 335-1...n; Figure 3B; column 4, lines 19-39).

Examiner respectfully notes that Cao discloses that it is the plurality of 1 x 2 switches (including elements 505-1...n as shown in Figure 5) in the “switch matrix” element that determines whether a particular wavelength in the WDM signal is added or dropped (column 5, lines 61-67; column 6, lines 1-44). Dispersion and amplitude compensation amounts are adjusted separately for every wavelength (such as via dispersion compensating fibers 330-1..n and variable attenuators 335-1..n within the “add/drop module” as shown in Figure 3B) and “independently” of whether a particular wavelength is subsequently added/dropped using the 1 x 2 switches. Therefore, at least in that sense, Cao discloses that the chromatic dispersion compensation and amplitude compensation of the output WDM optical signal is independent of the add/drop function.

Cao does not specifically disclose demultiplexing and multiplexing a respective WDM optical signal for “each one of N optical systems.” However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art.

Furthermore, Danagher et al. teach a programmable optical add/drop multiplexing method (Figure 4) that is related to the one disclosed by Cao, including:

demultiplexing WDM signals into a plurality of path signals each comprising at least one channel (using bidirectional optical multiplexers 402 in a demultiplexing direction; column 8, lines 11-14);

performing an add/drop function of selected ones of the path signals and establishing through paths of the remaining path signals (using 8 x 8 switching fabric 408; column 8, lines 20-31); and

multiplexing a plurality of path signals into output WDM signals (using bidirectional optical multiplexers 402 in a multiplexing direction).

Danagher et al. particularly teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of the demultiplexing/multiplexing elements 402 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one input and output WDM signal (and more than one optical system) as taught by Danagher et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding **claim 12**, Cao discloses performing amplitude compensation (using amplifier 305 and variable attenuators 335-1...n), wherein for the output WDM optical signal of the optical system, the power corresponds to target values which are suitable for transmission requirements of a respective optical system and independent of the add/drop function (column 4, lines 16-25; column 5, lines 24-37).

Regarding **claim 15**, Cao discloses that the performing amplitude compensation comprises performing amplitude compensation of at least one of the optical path signals of the optical system (using variable attenuators 335-1...n), wherein for respective ones of the optical path signals of the optical system, the power is set to a specific common value (column 5, lines 24-37).

Regarding **claim 7**, as similarly discussed above with regard to claim 1, Cao discloses a method of implementing programmable optical add/drop multiplexing (Figures 3A, 3B, and 5), the method comprising;

demultiplexing a respective input WDM optical signal into a plurality of optical path signals each comprising at least one channel (using WDM MUX/DEMUX 320 in add/drop module 10; Figure 3B; column 4, lines 16-57);

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using switch matrix module 30 (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44);

multiplexing a plurality of optical path signals into an output WDM optical signal (using WDM MUX/DEMUX 320 in the other add/drop module 20); and

performing chromatic dispersion compensation (using dispersion compensator (using dispersion compensator 310 and dispersion compensating fibers 330-1...n), wherein for the output WDM optical signal of the optical system, the chromatic dispersion corresponds to a target value which is suitable for transmission requirements of a respective optical system and wherein the target value is independent of the add/drop function (column 4 lines 26-45; column 5, lines 14-23).

Again, Examiner respectfully notes that Cao discloses that that the chromatic dispersion compensation of the output WDM optical signal is independent of the add/drop function, because Cao discloses that the plurality of 1 x 2 switches (including elements 505-1...n as shown in Figure 5) in the “switch matrix” element determine whether a particular wavelength in the WDM signal is added or dropped (column 5, lines 61-67; column 6, lines 1-44). Dispersion

Art Unit: 2613

compensation amounts are adjusted separately for every wavelength and “independently” of whether a particular wavelength is subsequently added/dropped using the 1 x 2 switches.

Again, Cao does not specifically disclose demultiplexing and multiplexing a respective WDM optical signal for “each one of N optical systems.” However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, as already discussed above with regard to claim 1, Danagher et al. teach a programmable optical add/drop multiplexing method (Figure 4) that is related to the one disclosed by Cao, including demultiplexing WDM signals, performing an add/drop function, and multiplexing channels into output WDM signals. Danagher et al. particularly teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of the demultiplexing/multiplexing elements 402 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one input and output WDM signal (and more than one optical system) as taught by Danagher et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding **claim 17**, as similarly discussed above with regard to claim 1, Cao discloses a programmable optical add/drop multiplexer (OADM) comprising:

an OADM element (including module 10 and module 20 shown in Figure 3A) comprising a demultiplexer (DeMUX) and a multiplexer (MUX) connected through a plurality of paths, wherein the DeMUX is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals each propagating through a respective one of the paths, and wherein the MUX is adapted to multiplex a plurality of optical path signals into an output WDM

Art Unit: 2613

optical signal (see Figure 3B; one WDM MUX/DEMUX element 320 is located in module 10 and another MUX/DEMUX 320 is located in module 20; column 4, lines 16-57); and

a plurality of switches 505 (Figure 5) each connected to respective ones of the paths of the OADM element, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the OADM element and establish through paths of remaining ones of the optical path signals of the OADM element (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44).

Cao further discloses a plurality of variable gain control elements (variable attenuators 335-1...n) adapted to perform amplitude compensation in a manner that the amplitude of the output WDM optical signal is independent of the state of the switches (column 5, lines 25-38).

Again, Examiner respectfully notes that Cao discloses that the amplitude compensation of the output WDM optical signal is independent of the add/drop function, because Cao discloses that the plurality of 1 x 2 switches (including elements 505-1...n as shown in Figure 5) in the “switch matrix” element determine whether a particular wavelength in the WDM signal is added or dropped (column 5, lines 61-67; column 6, lines 1-44). Amplitude compensation amounts are adjusted separately for every wavelength and “independently” of whether a particular wavelength is subsequently added/dropped using the 1 x 2 switches.

Again, Cao does not specifically disclose two or more OADM elements each comprising a demultiplexer and a multiplexer. However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Danagher et al. teach a programmable optical add/drop multiplexing system (Figure 4) that is related to the one disclosed by Cao as already discussed above with regard to claim 1. Danagher et al.

particularly teach multiple OADM elements each comprising a demultiplexer and a multiplexer, since they teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of demultiplexing/multiplexing elements 402 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one OADM element as taught by Danagher et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding **claim 19**, as similarly discussed above with regard to claim 17, Cao discloses a programmable OADM comprising:

an OADM element (including module 10 and module 20 shown in Figure 3A) comprising a demultiplexer (DeMUX) and a multiplexer (MUX) connected through a plurality of paths, wherein the DeMUX is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals each propagating through a respective one of the paths, and wherein the MUX is adapted to multiplex a plurality of optical path signals into an output WDM optical signal (see Figure 3B; one WDM MUX/DEMUX element 320 is located in module 10 and another MUX/DEMUX 320 is located in module 20; column 4, lines 16-57); and

a plurality of switches 505 (Figure 5) each connected to respective ones of the paths of the OADM element, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the OADM element and establish through paths of remaining ones of the optical path signals of the OADM element (column 3, lines 55-67; column 5, lines 39-67; column 6, lines 1-44).

Cao further discloses optical path length means for reducing effects of coherent cross-talk between the optical path signals (Figures 3A, 3B, and 5 show at least two such paths of approximately equal optical path lengths between the demultiplexing and the multiplexing with equivalent elements in the paths).

Again, Cao does not specifically disclose two or more OADM elements each comprising a demultiplexer and a multiplexer. However, larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art. Furthermore, Danagher et al. teach a programmable optical add/drop multiplexing system (Figure 4) that is related to the one disclosed by Cao as already discussed above with regard to claim 1. Danagher et al. particularly teach multiple OADM elements each comprising a demultiplexer and a multiplexer, since they teach demultiplexing and multiplexing a respective WDM optical signal for each one of N optical systems by using a plurality of demultiplexing/multiplexing elements 402 accordingly.

It would have been obvious to a person of ordinary skill in the art to include more than one OADM element as taught by Danagher et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network.

Regarding **claim 24**, Cao discloses means for chromatic dispersion compensation connected (dispersion compensator 310 and dispersion compensating fibers 330-1...n), wherein the chromatic dispersion of the output WDM signal corresponds to a respective target value and is independent of the state of the switches (column 4 lines 26-45; column 5, lines 14-23).

Regarding **claim 30**, Cao discloses means for amplitude compensation (amplifier 305 and variable attenuators 335-1...n), wherein the power of the output WDM signal of the OADM element is independent of the state of the switches (column 4, lines 16-25; column 5, lines 24-37).

Regarding **claim 33**, Cao discloses that the means for amplitude compensation comprises a plurality of VGCEs (variable attenuators 335-1...n) each connected through a respective one of the paths of the OADM element, each one of the VGCEs being adapted to perform amplitude compensation of a respective one of the optical path signals, wherein the powers of the respective ones of the optical path signals are set to a common value (column 5, lines 24-37).

Regarding **claims 13 and 31**, Cao discloses the performing amplitude compensation comprises performing amplification of the input WDM optical signal of the optical system (using an input amplifier 305 connected to DeMUX 320 as shown in Figure 3B), and therefore, the method and system described by Cao in view of Danagher et al. includes amplifying each one of the input WDM signals of N optical systems. However, Cao in view of Danagher et al. do not specifically disclose or suggest that the power of the input WDM optical signals of the optical system is set to a common value. However, it would be well understood in the art that the optimal target values of power may be the same for the WDM optical signals. Regarding claims 13 and 31, it would have been obvious to a person of ordinary skill in the art to have common values of power in the method and system described by Cao in view of Danagher et al. in order to more conveniently design and provide the amplitude compensation (since each signal would not have to be adjusted to a different target value).

Art Unit: 2613

Regarding **claims 14 and 32**, Cao in view of Danagher et al. describe a method and system as discussed above with regard to claim 12 and 30 respectively. Further regarding claims 14 and 32, Cao does not specifically disclose performing output amplitude compensation with an output amplifier connected to a MUX. However, Cao already discloses amplitude compensation in the optical communication system, and Danagher et al. further teach that elements for amplitude compensation may be provided in various places in an optical communication system, including at output WDM signals (see amplifier 24 at the output of add drop multiplexer 30 in Figure 1; Figure 2 shows how add drop multiplexer 30 produces an output at the output of a multiplexer element 350; column 4, lines 7-24; column 5, lines 3-28). It would have been obvious to a person of ordinary skill in the art to include output amplitude compensation as taught by Danagher et al. in the system described by Cao in view of Danagher et al. in order to more accurately maintain the signals at desired target values since output compensation would compensate any additional power loss experienced in the add/drop system itself after the input and path amplitude compensation already disclosed by Cao.

3. **Claims 2 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Danagher et al.** in view of **Ishikawa et al. (US 5,602,666 A)**.

Regarding **claim 2**, Danagher et al. disclose a method of implementing programmable optical add/drop multiplexing of N input WDM optical signals in an optical system (Figure 4), the method comprising:

demultiplexing each one of the N input WDM optical signals into a plurality of optical path signals each comprising at least one channel (using bidirectional optical multiplexer 402 in a demultiplexing direction; column 8, lines 11-14);

performing an add/drop function of selected ones of the optical path signals and establishing through paths of remaining ones of the optical path signals (using 8 x 8 switching fabric 408; column 8, lines 20-31); and

multiplexing respective ones of the optical path signals into N output WDM optical signals after the performing an add/drop function and the establishing through paths (using bidirectional optical multiplexers 402 in a multiplexing direction).

Danagher et al. do not specifically disclose introducing one or more dead-bands in each one of the input WDM optical signals, wherein one or more of the dead-bands are between two or more of the plurality of optical path signals.

However, Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). It would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et al. in the WDM signals of the method disclosed by Danagher et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

Regarding **claim 18**, as similarly discussed above with regard to claim 2, Danagher et al. disclose an optical system (Figure 4) comprising:

a programmable optical add/drop multiplexer (OADM) comprising:

two or more OADM elements wherein each one of the OADM elements comprises a DeMUX and a MUX connected through a plurality of paths, wherein the DeMUX (one of

Art Unit: 2613

demultiplexing/multiplexing elements 402) is adapted to demultiplex an input WDM optical signal into a plurality of optical path signals, each one of the optical path signals propagating through a respective one of the paths, and wherein the MUX (a corresponding one of demultiplexing/multiplexing elements 402) is adapted to multiplex a plurality of optical path signals into an output WDM optical signal (column 8, lines 11-14); and

a plurality of switches (in 8 x8 optical switch 408) each connected to respective ones of the paths of the two or more OADM elements, wherein the switches are adapted to perform an add/drop function of selected ones of the optical path signals of the two or more OADM elements and establish through paths of remaining ones of the optical path signals of the two or more OADM elements (column 8, lines 20-31).

Although Danagher et al. generally disclose generating the optical signals that are processed through the OADM, they do not specifically disclose a transmitter adapted to generate optical signals each comprising one or more channel wherein channel frequencies at which the optical signals are generated are limited to provide dead-bands.

However, again Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). It would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et al. in the WDM signals of the system disclosed by Danagher et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

Art Unit: 2613

4. **Claims 5 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Cao** in view of **Danagher et al.** as applied to claims 1 and 19, respectively, above, and further in view of **Ishikawa et al.**

Regarding **claims 5 and 23**, Cao in view of Danagher et al. describe a method and system as discussed above with regard to claims 1 and 19, respectively, including WDM signals, but they do not specifically disclose or teach dead-bands.

However, as similarly discussed above with regard to claims 2 and 18, Ishikawa et al. teach a related optical communication system including transmitting a wavelength division multiplexed signal with a plurality of channels, and they further teach dead-bands in between two or more of those channels (Figures 2 and 5; column 4, lines 35-67; column 5, lines 1-35; column 16, lines 63-67; column 17, lines 1-23). Regarding claims 5 and 23, it would have been obvious to a person of ordinary skill in the art to provide dead bands as suggested by Ishikawa et al. in the WDM signals of the method and system described by Cao in view of Danagher et al. in order to advantageously suppress cross-talk (see Ishikawa et al., column 5, lines 35-65, for example) and thereby more effectively transmit the signals through the network.

5. **Claims 8-11, 25-27, and 29** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Cao** in view of **Danagher et al.** as variously applied to claims 7 and 24 above, and further in view of **Suzuki et al. (US 6,005,702 A)**.

Regarding claims 8-11, Cao in view of Danagher et al. describe a method as discussed above with regard to claim 7. Regarding claims 25-27 and 29, Cao in view of Danagher et al. describe a system as discussed above with regard to claim 24.

Art Unit: 2613

Regarding **claims 8 and 25**, Cao discloses that the means for performing chromatic dispersion compensation comprises performing preliminary chromatic dispersion compensation of the input WDM optical signal (with a primary compensator 310 connected to a demux 320 as shown in Figure 3B). Cao in view of Danagher et al. do not specifically disclose or suggest performing slope of dispersion compensation.

However, Suzuki et al. teach an optical communication method that is related to the one described by Cao in view of Danagher et al., including performing chromatic dispersion compensation on a WDM signal (using dispersion compensation element 39; Figure 6). Suzuki et al. further teach including slope of dispersion compensation in addition to chromatic dispersion compensation with a dispersion slope compensation device 43 (column 6, lines 16-67; column 7, lines 1-44)

Regarding claims 8 and 25, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Suzuki et al. with the chromatic dispersion compensation in the system described by Cao in view of Danagher et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference.

Cao in view of Danagher et al. and Suzuki et al. also do not specifically disclose or suggest that the input WDM optical signals are set to have common values of chromatic dispersion and slope of dispersion, but it would be well understood in the art that the optimal target values of chromatic dispersion and slope of dispersion may be the same for the WDM optical signals.

For example, Cao particularly discloses that “Chromatic dispersion refers to the effect where the channels within a signal travel through an optic fiber at different speeds, i.e., longer wavelengths travel faster than shorter wavelengths....The resulting pulses of the signal will be stretched, possibly overlap, and make it more difficult for a receiver to distinguish where one pulse begins and another ends. This seriously compromises the integrity of the signal.” (Cao, Column 4, lines 30-39). Examiner notes that it would be well understood in the art that problems caused by different dispersion (i.e., different wavelength speeds) as disclosed by Cao could be mitigated by providing common target dispersion values in the system described by Cao in view of Danagher et al. and Suzuki et al. (i.e., the opposite of “different” dispersion).

Further regarding claims 8 and 25, it would have been obvious to a person of ordinary skill in the art to have common values of chromatic dispersion and slope of dispersion in the method described by Cao in view of Danagher et al. and Suzuki et al. in order to ensure that the wavelength channels are advantageously traveling at a same speed and thereby avoid overlapping each other.

Regarding **claims 10, 11, and 29**, Cao discloses that the performing chromatic dispersion compensation comprises performing secondary chromatic dispersion for the optical path signals of the optical system (with secondary compensators 330-1...n connected through the paths as shown in Figure 3B). Cao in view of Danagher et al. do not specifically disclose or suggest performing slope of dispersion compensation.

However, again, Suzuki et al. teach an optical communication method that is related to the one disclosed by Cao in view of Danagher et al., including performing chromatic dispersion compensation on a WDM signal (Figure 6). Suzuki et al. further teach including slope of

Art Unit: 2613

dispersion compensation in addition to chromatic dispersion compensation with a with a dispersion slope compensation device 43 (column 6, lines 16-67; column 7, lines 1-44).

Regarding claims 10, 11, and 29, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Suzuki et al. with the chromatic dispersion compensation in the system described by Cao in view of Danagher et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference.

Cao in view of Danagher et al. and Suzuki et al. also do not specifically disclose or suggest that the optical path signals of the optical systems are set to have common values of chromatic dispersion and slope of dispersion, but as similarly discussed above with regard to claims 8 and 25, it would be well understood in the art that the optimal target values of chromatic dispersion and slope of dispersion may be the same for the WDM optical signals. Further regarding claims 10, 11, and 29, it would have been obvious to a person of ordinary skill in the art to have common values of chromatic dispersion and slope of dispersion in the method described by Cao in view of Danagher et al. and Suzuki et al. in order to ensure that the wavelength channels are advantageously traveling at a same speed and thereby avoid overlapping each other.

Regarding **claims 9, 26, and 27**, Cao does not specifically disclose performing output chromatic dispersion compensation and slope of dispersion compensation with an output DSCM connected to a MUX. However, Cao already discloses compensating for dispersion in the optical communication system, and Suzuki et al. further teach that elements for dispersion compensation as well as slope of dispersion compensation may be provided at output WDM signals (Figure 6)

Again, it would have been obvious to a person of ordinary skill in the art to include slope of dispersion compensation as taught by Suzuki et al. with the chromatic dispersion compensation in the system described by Cao in view of Danagher et al. in order to more completely compensate effects of dispersion in the signals and thereby more effectively receive the signals with less distortion/interference. It also would have been obvious to a person of ordinary skill in the art to include output compensation as taught by Suzuki et al. in the system described by Cao in view of Danagher et al. in order to more completely compensate effects of dispersion in the signals since output compensation would compensate any additional dispersion experienced in the add/drop system itself after the input and path dispersion compensation already disclosed by Cao.

6. **Claim 34** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Cao** in view of **Danagher et al.** as applied to claim 33 above, and further in view of **Takatsu et al. (US 6,441,955 B1)**.

Regarding **claim 34**, Cao in view of Danagher et al. describe a system as discussed above with regard to claim 33, including a plurality of variable gain control elements (variable attenuators 335-1...n), but they do not specifically disclose or suggest that at least one of the VGCEs is adapted to perform a mute function.

However, Takatsu et al. teach an optical communication system (Figure 8) including a WDM signal with a plurality of channels and variable gain control elements (such as variable attenuator 2-1 shown in Figure 8) for controlling the power of each channel. They further teach that the variable gain control element are adapted to mute a particular optical channel (column 13, lines 27-67; column 14, lines 1-7).

It would have been obvious to a person of ordinary skill in the art to provide a mute function as suggested by Takatsu et al. in the VGCEs already disclosed by Cao in the system described by Cao in view of Danagher et al., in order to shut down a particular channel if errors are detected on the channel so that erroneous signals are not received.

Response to Arguments

7. Applicant's arguments filed 01 February 2007 have been fully considered but they are not persuasive.

8. Examiner respectfully disagrees with Applicant's assertion on pages 2-3 of the response that Cao does not disclose chromatic dispersion compensation and amplitude compensation that is "independent" of the add/drop function as recited in the claims. On the contrary, Cao discloses that it is the plurality of 1 x 2 switches (including elements 505-1...n as shown in Figure 5) in the "switch matrix" element that determines whether a particular wavelength in the WDM signal is added or dropped (column 5, lines 61-67; column 6, lines 1-44). Dispersion and amplitude compensation amounts are adjusted separately for every wavelength (such as via dispersion compensating fibers 330-1...n and variable attenuators 335-1...n within the "add/drop module" as shown in Figure 3B) and "independently" of whether a particular wavelength is subsequently added/dropped using the 1 x 2 switches. Therefore, at least in that sense, Cao discloses that the chromatic dispersion compensation and amplitude compensation of the output WDM optical signal is independent of the add/drop function.

9. In response to Applicant's argument on pages 3-4 of the response that there is no suggestion to combine the Cao and Danagher et al. references, Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to

Art Unit: 2613

produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Examiner respectfully submits that larger optical networks including multiple WDM signals (each comprising multiple channels) are well known in the art and that Danagher et al. teach one example of a larger network with "N optical systems" wherein wavelengths may be redirected from one optical system to another (Figure 4) so that greater amounts of data are directed among a plurality of fibers/systems. It would have been obvious to a person of ordinary skill in the art to include more than one input and output WDM signal (and more than one optical system) as taught by Danagher et al. in the method disclosed by Cao in order to process greater amounts of data on multiple incoming and outgoing fibers/optical systems in a large optical network. In response to Applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. However, so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

10. In response to Applicant's comments on pages 4-5 of the response regarding claims 8-11, 25-27, and 29, again, Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where

Art Unit: 2613

there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art.

In this case, regarding claims 8, 10, 11, 25, and 29 in particular, Examiner respectfully maintains that it would be well understood in the art that the optimal target values of chromatic dispersion and slope of dispersion may be the same for the WDM optical signals. Again, Examiner respectfully notes that Cao particularly discloses that “Chromatic dispersion refers to the effect where the channels within a signal travel through an optic fiber at different speeds, i.e., longer wavelengths travel faster than shorter wavelengths....The resulting pulses of the signal will be stretched, possibly overlap, and make it more difficult for a receiver to distinguish where one pulse begins and another ends. This seriously compromises the integrity of the signal.” (Cao, Column 4, lines 30-39). Examiner notes that it would be well understood in the art that problems caused by different dispersion (i.e., different wavelength speeds) as disclosed by Cao could be mitigated by providing common target dispersion values in the system described by Cao in view of Danagher et al. and Suzuki et al. (i.e., the opposite of “different” dispersion). It would have been obvious to a person of ordinary skill in the art to have common values of chromatic dispersion and slope of dispersion in the method described by Cao in view of Danagher et al. and Suzuki et al. in order to ensure that the wavelength channels are advantageously traveling at a same speed and thereby avoid overlapping each other.

Regarding claims 9, 26, and 27, Examiner respectfully notes that claims 9, 26, and 27 do not specifically recite “common values” of dispersion, and therefore, Applicant’s arguments on pages 4-5 related to that particular limitation are moot with respect to those claims. Although the

Art Unit: 2613

claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

11. In response to Applicant's argument on page 5 of the response that Suzuki et al. is nonanalogous art, it has been held that a prior art reference must either be in the field of Applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which Applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Examiner respectfully maintains that Suzuki et al. teach an optical communication method that is related to the one described by Cao in view of Danagher et al., including performing chromatic dispersion compensation on a WDM signal (using dispersion compensation element 39; Figure 6). The teachings of Suzuki et al. are clearly directed to ensuring that optical data communications are successfully transmitted from one point to another, as in the system already suggested by Cao in view of Danagher et al.

12. Lastly, Examiner respectfully notes that Applicant's arguments with respect to Cao or Cao in combination with other references are moot with respect to independent claims 2 and 18, because the rejections of claims 2 and 18 do not rely on Cao. Instead, claims 2 and 18 have been rejected as being unpatentable over Danagher et al. in view of Ishikawa et al. in the previous Office action and in the present Office action. Examiner respectfully notes that Applicant did not specifically address claims 2 or 18, or the combination of Danagher et al. in view of Ishikawa et al. in the response.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 7:30 to 4:00.

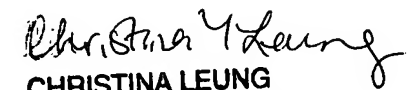
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

Art Unit: 2613

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PRIMARY EXAMINER